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EXAMINER	
HO, ALLEN C	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 04/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/702,362	BIJJANI ET AL.	
	Examiner	Art Unit	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *32* is/are allowed.

6)☒ Claim(s) *1-5,7,9-17 and 19-31* is/are rejected.

7)☒ Claim(s) *6,8 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08032004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Page 11, line 31, "71 a,b" should be replaced by --70 a,b--.

Appropriate correction is required.

Claim Objections

2. Claim 1 is objected to because of the following informalities: line 3, "last" should be replaced by --least--. Appropriate correction is required.

3. Claim 3 is objected to because of the following informalities: line 8, "attention" should be replaced by --attenuation--. Appropriate correction is required.

4. Claim 27 is objected to because of the following informalities: line 12, "attention" should be replaced by --attenuation--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 9, 10, and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Peschmann (U. S. Patent No. 5,367,552).

With respect to claim 1, Peschmann disclosed a method of analyzing an object comprising: scanning the object with at least two beams of different energies (column 10, lines 48-68) from a plurality of angles to create at least high and low energy readings; determining a density (either a prescan or a CT scan) of at least a portion of the object; updating the density based on high and low energy readings (since effective atomic number could be obtained from high and low energy readings, this data would augment the data on density).

With respect to claim 2, Peschmann disclosed the method of claim 1, further comprising constructing (**110**) an image of at least a portion of the object using computed tomography, wherein the updating occurs before (**106**), during, or after the image is constructed.

With respect to claim 3, Peschmann disclosed a method of screening items to detect target objects therein, comprising: (a) passing x-rays (**48**) through an item from a plurality of different angles and with plurality of energy levels (column 10, lines 48-68); (b) detecting (**50**) x-rays that have been attenuated by passing through the item to produced detected values representative of the attenuation of the x-rays by the item; (c) analyzing the detected values to produce a first representation of objects within the item, the objects in the first representation being based at least in part on a ratio of attenuation of x-rays having different energies (a first representation based on atomic numbers, pre-scanned with a dual-energy CT, column 9, lines 26-48, column 10, lines 48-68); (d) performing a computed tomographic reconstruction (**28**) of at least a portion of the detected values to produce a second representation of one or more objects within the item (a second representation based on attenuation or density); and (e) forming a third representation (column 8, lines 51-60) of objects in the item by combining the first and second

representations (a third representation with objects highlighted based on density and/or atomic numbers).

With respect to claim 9, Peschmann disclosed the method of claim 3, wherein the second representation of objects is based on density of objects (column 7, lines 67-68; column 8, lines 1-2).

With respect to claim 10, Peschmann disclosed the method of claim 3, wherein analyzing the detected values includes forming a two-dimensional array of pixels (CT projection data or sinogram) representing an item (column 9, lines 26-68).

With respect to claim 13, Peschmann disclosed the method of claim 3, wherein producing the first representation includes assigning an effective atomic number to each object (column 10, lines 48-68).

With respect to claim 14, Peschmann disclosed the method of claim 13, additionally comprising selecting objects of interest based in part on the effective atomic numbers (column 10, lines 48-68), and wherein performing the computed tomographic reconstruction is altered by the selected objects of interest.

With respect to claim 15, Peschmann disclosed the method of claim 14, wherein the computed tomographic reconstruction reconstructs a slice of the item selected to pass through an object of interest (since CT image data are collected in slices).

With respect to claim 16, Peschmann disclosed the method of claim 3, wherein the first representation represents objects in a two-dimensional coordinate system (CT projection data or sinogram, column 9, lines 26-48) and the second representation represents objects in a three-dimensional coordinate system (CT reconstructed image).

With respect to claim 17, Peschmann disclosed the method of claim 3, wherein the first representation is formed from an image of the item from only one view (column 9, lines 26-38).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 5, 7, 11, 12, and 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peschmann (U. S. Patent No. 5,367,552) as applied to claims 3 and 10 above.

With respect to claims 5, 7, 11, and 12, Peschmann disclosed the method of claims 3 and 10. However, although Peschmann taught identifying objects based on atomic number (column 10, lines 48-68) and mass (column 7, lines 36-52), Peschmann failed to teach that the first representation includes as objects areas with a scan of an item having similar atomic number and mass.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include as objects areas having similar atomic number and mass, since a person would be motivated to identify the object by determining a shape and a size of the object (column 8, lines 33-35) that comprises areas having similar atomic numbers and mass.

With respect to claim 19, Peschmann disclosed the method of claim 3. However, although Peschmann disclosed an automatic identification procedure (column 8, lines 51-53),

Peschmann failed to teach automatically identifying a target object based on the third representation.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to automatically identifying a target object based on the third representation, since a person would be motivated to automate the process and to confirm the identification in the final step.

With respect to claim 20, Peschmann disclosed the method of claim 13. However, Peschmann failed to teach that the second representation of objects includes a confidence level associated with each object.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to associate a confidence level to each group, since a person would be motivated to statistically quantify the variation or distribution in the parameters (*e. g.*, atomic number, density, mass) in each group.

With respect to claims 21-25, Peschmann disclosed the method of claim 3, wherein analyzing the detected values includes forming a plurality of pixels (CT projection data or sinogram), and grouping pixels of similar characteristics (column 7, lines 27-40). However, Peschmann failed to teach assigning a confidence level to each group.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to assign a confidence level to each group, since a person would be motivated to statistically quantify the variation or distribution in the parameters (*e. g.*, atomic number, density, mass) in each group.

9. Claims 4 and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peschmann (U. S. Patent No. 5,367,552).

With respect to claim 4, Peschmann disclosed a method of screening items to detect target object therein, comprising: (a) passing x-rays (**48**) through an item from a plurality of different angles and with plurality of energy levels (column 10, lines 48-68); (b) detecting (**50**) x-rays that have been attenuated by passing through the item to produced detected values representative of the attenuation of the x-rays by the item; (c) analyzing at least a portion of the detected values to produce a first representation of objects within the item, the objects in the first representation being based at least in part on a ratio of attenuation of x-rays having different energies (a first representation based on atomic numbers, pre-scanned with a dual-energy CT, column 9, lines 26-48, column 10, lines 48-68); (d) performing a computation on at least a portion of the detected values to compute density of a portion of the item (column 7, lines 67-68; column 8, lines 1-2).

However, Peschmann failed to teach using the density information to determine whether to update the first representation of objects.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the density information to determine whether to update the first representation of objects, since a person would be motivated to use the density information or any additional information to augment the first representation.

With respect to claim 26, Peschmann disclosed a method of analyzing an object to identify a target object comprising: performing a dual-energy computed tomography scan of at least a portion of the object (column 10, lines 48-68); and analyzing information relating to an

effective atomic number and a density of at least part of the portion of the object to determine a likelihood that the object is a target.

However, Peschmann failed to teach that analyzing also considers at least one of confidence levels of information relating to atomic number and density, thickness of a portion of the object, and proximity of the object to metal.

Peschmann taught that there is a confidence level (uncertainty or probability) associated with identification of objects (column 10, lines 22-24). Additional considerations might increase the confidence level (column 10, lines 22-68; column 11, lines 1-15).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to consider at least one of confidence levels of information relating to atomic number and density, thickness of a portion of the object, and proximity of the object to metal, since a person would be motivated to base a decision on the confidence level of information.

With respect to claim 27, Peschmann disclosed a method of screening item to detect target objects therein, comprising: (a) passing x-rays (**48**) through an item from a plurality of different angles and with plurality of energy levels (column 10, lines 48-68); (b) detecting (**50**) x-rays that have been attenuated by passing through the item to produced detected values representative of the attenuation of the x-rays by the item; (c) performing a computed tomographic reconstruction of at least a portion of the detected values to produce a representation of one or more objects within the item, the representation including an association between each object and a value indicative of density (**110**); (d) analyzing at least a portion of the detected values to associate a value indicative of effective atomic number with the objects,

the value indicative of effective atomic number being based at least on a ratio of attenuation of x-rays having different energies (column 10, lines 48-68); and (f) indicating an object based on representation, including the values indicative of density and effective atomic number.

However, although Peschmann taught there is an uncertainty involved in identifying an object (column 10, lines 22-24), Peschmann failed to teach: (e) assigning a confidence value to at least one of the value indicative of density and the value indicative of effective atomic number; and (f) indicating an object based on the confidence value.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to assign a confidence value to at least one of the value indicative of density and the value indicative of effective atomic number, since a person would be motivated to statistically quantify the variation or distribution in the density and effective atomic number. Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to indicate an object based on confidence value, since a person would be motivated to base a decision on the confidence level of information.

With respect to claim 28, Peschmann disclosed the method of claim 27, wherein indicating an object includes indicating the object is a target (**108**).

With respect to claim 29, Peschmann disclosed the method of claim 27, wherein indicating an object includes indicating an object and a probability (confidence value) the object is a target.

With respect to claim 30, Peschmann disclosed the method of claim 27, However, although Peschmann taught comparing the shape of the object to predetermined information (a list) of characteristics corresponding to target objects (column 10, lines 37-46) in order to

increase confidence level, Peschmann failed to teach comparing values indicative of effective atomic number and physical extent of objects to predetermined information on the effective atomic number and physical extent of target object

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to compare effective atomic number and physical extent of objects to predetermined information on effective atomic numbers and physical extent of target objects, since a person would be motivated to identify a target object at increased confidence level using additional parameters.

With respect to claim 31, Peschmann disclosed the method of claim 30. However, Peschmann failed to teach that the predetermined information includes a histogram of probabilities that an object having a combination of atomic numbers and physical dimensions is a target object.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a histogram of probabilities in the predetermined information, since a person would be motivated to include probabilities in the predetermined information in response to the inherent uncertainty in the measurement.

Allowable Subject Matter

10. Claims 6, 8, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claim 32 is allowed.

12. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 6, the prior art fails to teach or fairly suggest that forming the third representation includes altering the first representation by changing the estimate of the atomic number of an object based on the second representation of objects as claimed.

With respect to claim 8, the prior art fails to teach or fairly suggest forming a third representation includes altering a representation of an object in the first representation based on the second representation indicating that a plurality of overlapping objects are represented as one object in the first representation as claimed.

With respect to claim 18, the prior art fails to teach or fairly suggest forming a third representation includes altering the effective atomic number and mass associated with objects contained in the first representation based on density of objects contained in second representation as claimed.

With respect to claim 32, the prior art fails to teach or fairly suggest indicating an object based on the first representation, the second representation, and the confidence, wherein objects are indicated when they have an effective atomic number in a predetermined range and a predetermined proximity to another object that has an effective atomic number indicative of metal as claimed.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(1) Schafer (U. S. Patent No. 6,418,189 B1) disclosed an explosive material detection apparatus and method using dual-energy information of a scan.

(2) Gordon (U. S. Patent No. 5,796,802) disclosed multiple angle pre-screening tomographic systems and methods.

(3) Alvarez *et al.* (U. S. Patent No. 4,029,963) disclosed dual-energy decomposition.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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